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(54) METHOD AND APPARATUS FOR APPLYING FLOCKING TO A BASE

(71) We, SCHMIDT INDUSTRIES INC., a Corporation of the State of North Carolina, United States of America, of 800 Foster Avenue, Charlotte, North Carolina, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a method of applying multi-color flock to a base structure in a predetermined pattern.

The invention provides a method of applying flock which includes flock of different colors to a base surface in a predetermined pattern, said method including the steps of applying an adhesive to said base surface through a master stencil element perforated with said predetermined pattern, forming a series of individual flocking stencils from a fine mesh gauze-like screening material in which only selected portions of said stencils are pervious having said gauze-like material disposed within said pervious selected portions, each of said individual flocking stencils being formed with said pervious portion thereof representing a different and distinct portion of said predetermined pattern, sequentially advancing said base to which said adhesive has been applied through a series of flocking stations, each flocking station including a supply of flock and including a different one of said flocking stencils interposed between and spaced from said supply and said base surface with the positional relationship between each said flocking stencil and said base surface being identical for each flocking operation, the flocking supply for each operation being of a different color, and imposing an electrical potential between the flock supply and the base surface for each flocking operation to cause said flock to pass through said gauze-like material disposed within the pervious portions of said flocking stencil in

perpendicular relation thereto and adhere evenly to a portion of said base surface corresponding to the area defined by said pervious portions in said flocking stencil.

Preferably said flock supply for each station is contained in a box-like container having a metal bottom plate to which a positive electrical source is electrically connected, said base surface for each station being carried by a metal plate disposed across the top of said container, said metal plate being electrically connected to ground.

Said flocking stencil may be formed from a polyester gauze having a fine mesh.

The invention also provides an apparatus for applying flock which includes flock of different colors to a base surface in a predetermined pattern, said apparatus including a master stencil element perforated with said predetermined pattern through which an adhesive can be applied to said base surface, and a plurality of flocking stations, each flocking station including a supply of flock, a flocking stencil of fine gauze-like screening material perforated with a different portion of said predetermined pattern and means for supporting said base surface above said supply of flocking with said flocking stencil interposed between said flocking supply and said base surface, said supporting means including means for fixing the location of said base surface and said flocking stencil to have a positional relationship which is precisely identical at each said flocking operation, and means for imposing an electrical potential between the flocking supply and the base surface at each flocking operation to cause said flock to pass through the perforations in said flocking stencil in perpendicular relation thereto and adhere to a portion of said base surface corresponding to the perforations in said flocking stencil.

Said supporting means for each flocking operation may include a supporting surface for supporting said base surface, in that said

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means for fixing the location of said base surface and said flocking stencil includes fixed guide means on said supporting surface for positioning said base surface thereon, and further includes fixed means for selectively attaching said flocking stencil to said supporting surface at a fixed position thereon superimposed over said positioned base surface in spaced relation thereto, and in that said supporting surface is a metal plate connected to ground and said flocking supply is contained in a box having metal bottom plate connected to a positive electrical source.

The following is a description of a specific embodiment of the invention, reference being made to the accompanying drawings in which:

Figure 1 is a plan view illustrating a master stencil of a selected flocking design, and a plurality of flocking stencils, each flocking stencil being used for a different colored flock;

Figure 2 is a perspective view of suitable equipment for practicing the flocking method of the present invention;

Figure 3 is a detail view illustrating one of the flocking stations of the equipment illustrated in Figure 2; and

Figure 4 is a side elevational view of the flocking station illustrated in Figure 3.

Looking now in greater detail at the accompanying drawings, Figure 2 illustrates equipment for applying flock to a substrate or base in accordance with the present invention. This equipment includes a station 10 at which an adhesive applying operation is carried out, and four separate stations 12 at which flocking operations are carried out, each of which is identical except for the color of the flock applied thereat and the stencil employed.

The adhesive station includes an upper work surface 14 to which a side guide plate 16 is secured and to which a similar top guide plate (not shown) is secured to extend in perpendicular relation to the side guide plate 16 for particularly locating a base member 18 to which flock is to be applied, the base member 18 being positioned flush against the two guide plates. A pair of hinges 20 having upstanding rods 22 are secured to the work surface 14, and a pair of locating pins 24 are permanently secured to the front side of the adhesive station 10. An adhesive applying stencil 26, the details of which will be explained in further detail presently, is mounted in a frame 28 that includes projecting brackets 30 having apertures for receiving the locating pins 24 and that includes similar brackets (not shown) for receiving the upstanding rods 22. It will be noted that the base member 18 and the adhesive stencil 26 have exact positions on the work surface 14, and the

precise relationship of the stencil 26 to the base member 18 is positively maintained by resilient bands 32 which are secured to the front wall of adhesive station 10 and arranged to slide over the brackets 30 for holding the frame 28 as adhesive is applied to the stencil 26 with a brush 34 or similar implement.

Since the four flocking stations 12 are identical except for the color of the flocking applied, a description of the first flocking operation 12 will serve to provide an understanding of the remaining flocking stations. The flocking station 12 includes a work surface 36 on which lies a mounting box 38 having a holding surface 40 which is preferably a 1/8-inch aluminium plate formed with a plurality of apertures 42 opening into the interior of the mounting box 38 wherein a vacuum is established by a hose 44 leading from the interior of the mounting box to any convenient vacuum source (not shown). The holding surface 40 is provided with a top guide plate 46 and a side guide plate 48, and with locating pins 50, upstanding rods 52, and resilient bands 54, all corresponding to like elements as previously described in connection with the adhesive station 10. The mounting box 38 is also provided with a lifting handle 56 and a spacing block 58 rigidly secured thereto, and the entire mounting box 38 is connected by hinges 60 to a dividing element 62 lying between the mounting box 38 and an open box-like container 64 in which a supply of flocking 66 is held. The container 64 is formed by a galvanized metal bottom plate 68 and clear sides 70 formed of an acrylic plastics extending above and beneath the bottom plate 68. To establish the electrical potential for causing the flock 66 to be applied to the base member 18 in a manner to be described presently, the galvanized metal bottom plate 68 is connected by an electrical wire 72 to a conventional high voltage direct-current transformer 74 (i.e., 100 Kv) so that a positive potential is imposed on the bottom plate 68, and the aluminium plate forming the holding surface 40 is connected by wires 82 to any convenient ground whereby this aluminium plate is electrically negative. The transformer 74 may be used for all of the flocking stations 12 which are wired in series, and a single control switch 74' is provided for energizing the transformer 74. If desired, a separate control switch could be provided for each flocking station 12.

In Figure 1 there is illustrated a typical series of stencils used in connection with the method of the present invention, these stencils displaying a relative intricate design in the form of a gamecock which is to be flocked onto the base member 18. At the

left of Figure 1, the adhesive stencil 26 is shown with the outline of the gamecock displayed thereon. The adhesive stencil 26 is preferably formed of a polyester filament gauze having a 40—12 mesh (i.e. a mesh having 40 filaments per square inch running in one direction and 12 filaments per square inch running in a perpendicular direction thereto), and this stencil 26 is impervious except where it is perforated to display the outline of the overall gamecock design. The other three stencils 76, 76', and 76'' are flocking stencils mounted in frames 78, each stencil being formed of a polyester filament gauze (40—40 mesh) and each being used for applying a different color flock to the base member 18. It will be noted that each of flocking stencils 76, 76' and 76'' is perforated with a different and distinct portion of the overall outline in the adhesive stencil 26, and the three portions, if combined together, will make up the entire overall outline. In the typical gamecock design shown in Figure 1, flocking screen 76 would be used with black flock, flocking screen 76' would be used with yellow flock, and flocking screen 76'' would be used with red flock. Finally, it will be noted in comparing flocking screens 76, 76' and 76'' that a different portion of the overall design defined by one flocking screen is immediately contiguous to the portion of another flocking screen in the overall design, and it will therefore be apparent that if the overall design, when completely flocked onto the base member 18, is to be attractive, the lines of demarcation between the different colored flocks must be sharp and distinctive even when only small areas are flocked with one color as typified, for example, in flocking stencil 76'.

With the various components arranged in the aforementioned manner, the method of applying flock in accordance with the present invention will now be described. A selected design such as the gamecock illustrated in Figure 1 is properly imposed in outline form on the adhesive or master stencil 26 which is perforated with this design, and a flocking stencil 76 for each color used in the overall design is similarly perforated with the particular portion of the overall design selected for such color.

A base member 18, which may be cardboard or any other material suitable for receiving flock, is positioned at the adhesive station 10 by placing one side edge and the top edge of the base member 18 flush against side guide plate 16 and the top guide plate, respectively, on the work surface 14. Next, the master stencil 26 is placed on the top surface of the base member 18 and positioned exactly with respect thereto by the frame 28 being

disposed on the upstanding rods 22 and on the locating pins 24 as seen in Figure 2, and the adhesive is applied to the master stencil 26 by a brush 34 or the like whereby the adhesive will penetrate only the perforated portion of the master stencil 26 and the base member 18 will be left with adhesive applied over an area corresponding to the overall design outline on the master stencil 26. As will become apparent subsequently, the base member 18 could have the adhesive applied over the entire top surface thereof, by this would result in a waste of adhesive, and could mar the appearance of the base member 18 in areas where flocking is not to be applied.

After the adhesive has been applied to the base member 18, the master stencil 26 and frame 28 are released by disconnecting resilient bands 32, and the frame 28 is pivoted upwardly about hinges 20 to permit removal of the base member 18. The base member 18 is then placed on the surface 40 of the mounting box 38 at the first flocking station 12. The base member 18 is properly positioned on the holding surface 40 when it is flush with guide plates 46, 48, and the vacuum within the mounting box 38 will act through apertures 42 to hold securely the base member 18 in place. The flock container 64 is then filled with an appropriate dyed (i.e., black) flock 66, preferably 30 denier 080 nylon flock which has been shown to give the best results in the method of the present invention. The flocking stencil 76, designed for the color black, is then placed over the base member 18 as shown in Figure 3, and the disposition of the flocking stencil 76 within its frame 78 will result in a slight spacing between the base member 18 and the flocking stencil 76. A particular and definite relationship is established between the flocking stencil 76 and the base member 18 by virtue of the locating pins 50 and upstanding rods 52, and the guide plates 46, 48. Resilient bands 54 are then placed over the brackets 80 on the frame 78 (see Figure 4) to maintain this definite relationship, and the mounting box 38 is then pivoted about its hinges 60 from the dotted line position in Figure 4 atop the work surface 36 to its full line position atop the flock container 64. It will be noted in Figure 4 that the spacing block 58 abuts the work surface 36 and positions the mounting box 38 so that the flocking screen 76 is interposed in spaced relation between the base member 18 and the supply of flock 66. The transformer 74 is then energized by switch 74' whereby an electrical potential is established between the holding surfaces 40 and the metal bottom 68 of the flocking container 64. Generally speaking it is desirable to provide an electrical potential of approximately 10,000 volts for each inch

of separation between the grounded holding surface 40 and the bottom 68 of the flock container 64, and in the disclosed embodiment of the present invention this separation is in the range of 4 to 6 inches. Thus, the transformer 74 establishes a proper electrical potential which causes the individual flock filaments 66 to "shoot" or pass through the perforations in the flocking stencil 76 in perpendicular relation thereto so that only the leading end of each such flock filament 66 will engage the adhesive pattern on the base member 18 and will adhere to the base member 18 in perpendicular or upstanding relation thereto. It will be noted that this "shooting" of the flocking filaments 66 perpendicularly through perforations in the flocking stencil 76 that are carefully defined and positioned with respect to the base element 18 will result in the flock filaments 66 forming a pattern on the base element 18 which corresponds identically to the perforated pattern of the flocking stencil 76.

As soon as the black flock 66 has been applied to the base member 18 at the first flocking station 12 in the above-described manner, the base member 18 is immediately removed and the same procedure is followed in applying yellow flock 66 to the base member 18 at the second flocking station 12 using the next flocking stencil 76'. Thereafter, red flock is applied at the third flocking station 12 using the third flocking stencil 76". It is important to note that even though the perforated portions of the flocking stencils 76, 76' and 76" are immediately contiguous in the completed overall design, the final flocked design which appears on the base member 18 includes sharp and distinct lines between the different colors of flock because the positional relationship between the base member 18 and the flocking stencils 76, 76' and 76" is identical at each flocking operation and because the individual flocking filaments are "shot" perpendicularly through the stencil perforations to provide a sharply defined pattern on the base member 18.

WHAT WE CLAIM IS:—

1. A method of applying flock which includes flock of different colors to a base surface on a predetermined pattern, said method including the steps of applying an adhesive to said base surface through a master stencil element perforated with said predetermined pattern, forming a series of individual flocking stencils from a fine mesh gauze-like screening material in which only selected portions of said stencils are pervious having said gauze-like material disposed within said pervious selected portions, each of said individual flocking

stencils being formed with said pervious portion thereof representing a different and distinct portion of said predetermined pattern, sequentially advancing said base to which said adhesive has been applied through a series of flocking stations, each flocking station including a supply of flock and including a different one of said flocking stencils interposed between and spaced from said supply and said base surface with the positional relationship between each said flocking stencil and said base surface being identical for each flocking operation, the flocking supply for each operation being of a different color, and imposing an electrical potential between the flock supply and the base surface for each flocking operation to cause said flock to pass through said gauze-like material disposed within the pervious portions of said flocking stencil in perpendicular relation thereto and adhere evenly to a portion of said base surface corresponding to the area defined by said pervious portions in said flocking stencil.

2. A method of applying flocking as defined in Claim 1 and further characterized in that said flock supply for each station is contained in a box-like container having a metal bottom plate to which a positive electrical source is electrically connected, said base surface for each station being carried by a metal plate disposed across the top of said container, said metal plate being electrically connected to ground.

3. A method of applying flocking as defined in Claim 1 and further characterized in that said flocking stencil is formed of a polyester filament gauze having a fine mesh.

4. Apparatus for applying flock which includes flock of different colors to a base surface in a predetermined pattern, said apparatus including a master stencil element perforated with said predetermined pattern through which an adhesive can be applied to said base surface, and a plurality of flocking stations, each flocking station including a supply of flock, a flocking stencil of fine mesh gauze-like screening material perforated with a different portion of said predetermined pattern and means for supporting said base surface above said supply of flocking with said flocking stencil interposed between said flocking supply and said base surface, said supporting means including means for fixing the location of said base surface and said flocking stencil to have a positional relationship which is precisely identical at each said flocking operation, and means for imposing an electrical potential between the flocking supply and the base surface at

each flocking operation to cause said flock to pass through the perforations in said flocking stencil in perpendicular relation thereto and adhere to a portion of said base surface corresponding to the perforations in said flocking stencil.

5. Apparatus for applying flocking to a base surface as defined in Claim 4 and further characterized in that said supporting means for each said flocking operation includes a supporting surface for supporting said base surface, in that said means for fixing the location of said base surface and said flocking stencil includes fixed guide means on said supporting surface for positioning said base surface thereon, and further includes fixed means for selectively attaching said flocking stencil to said supporting surface at a fixed position thereon superimposed over said

positioned base surface in spaced relation thereto, and in that said supporting surface is a metal plate connected to ground and said flocking supply is contained in a box having metal bottom plate connected to a positive electrical source.

6. A method of apply flocking as claimed in Claim 1 and substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

7. Apparatus for applying flocking substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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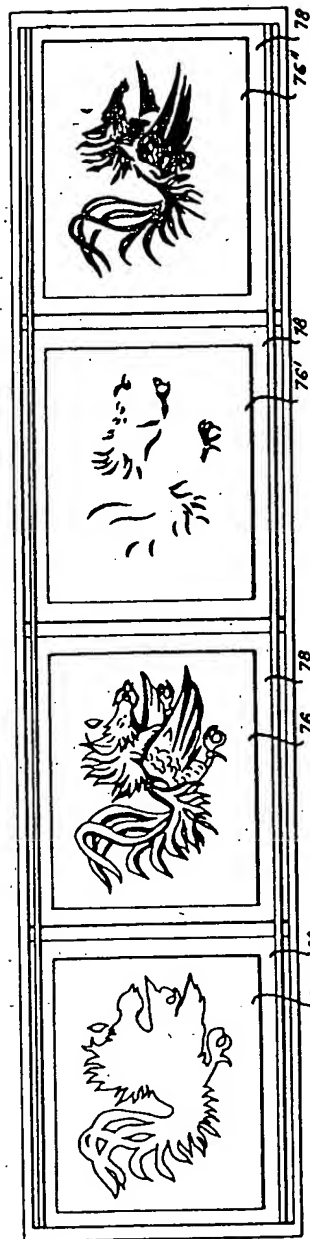
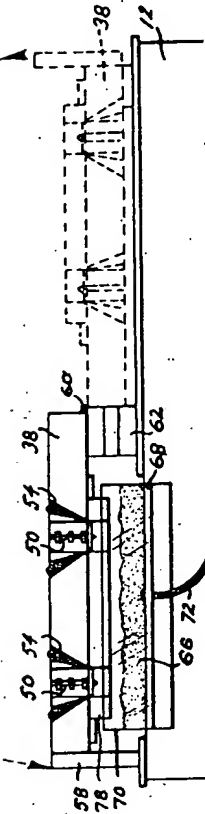


Fig. 1

Fig. 4



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COMPLETE SPECIFICATION

2 SHEETS

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Sheet 2

Fig. 3

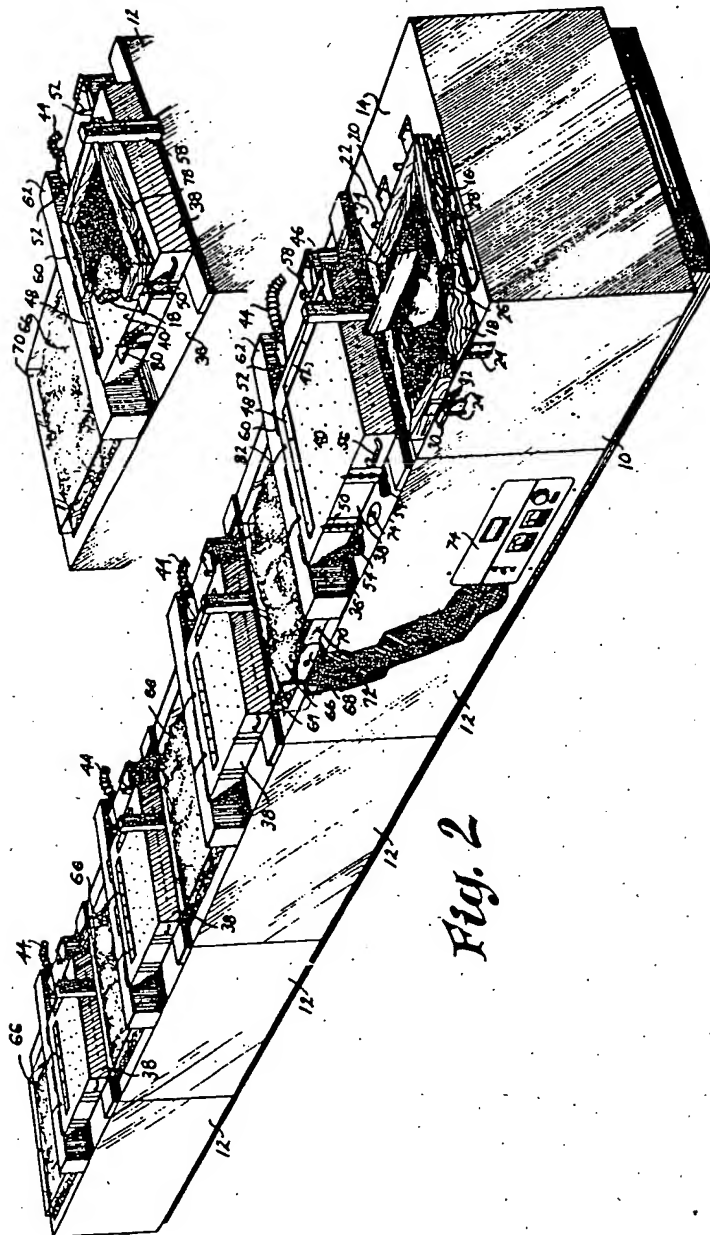


Fig. 2